U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Pseudognaphalium sandwicensium* var. *molokaiense*

COMMON NAME: `Ena`ena

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: August 2005

STATUS/ACTION

___ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status

___ New candidate

__X_ Continuing candidate

___ Non-petitioned

_X__ Petitioned - Date petition received: May 11, 2004

_ 90-day positive - FR date:

_X_ 12-month warranted but precluded - FR date: _May 11, 2005_____

_N_ Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:

a. Is listing warranted (if yes, see summary of threats below)? _yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? _yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions. During the past 12 months, most of our national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (http://endangered.fws.gov).

___ Listing priority change

Former LP: ___

New LP: ___

Date when the species first became a Candidate (as currently defined): 1980

___ Candidate removal: Former LP: __

___ A – Taxon is more abundant or widespread than previously believed or not subject to

the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

___U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

___ F – Range is no longer a U.S. territory.

___ I – Insufficient information exists on biological vulnerability and threats to support listing.

___ M – Taxon mistakenly included in past notice of review.

___ N – Taxon does not meet the Act's definition of "species."

___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Flowering plants, Asteraceae (Sunflower family)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, islands of Molokai, Maui, Lanai, and Oahu

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, islands of Molokai, Maui

LAND OWNERSHIP: State and private lands.

LEAD REGION CONTACT: Paul Phifer, 503-872-2823, paul_phifer@fws.gov

LEAD FIELD OFFICE CONTACT: Pacific Islands Fish and Wildlife Office, Christa Russell, 808-792-9400, christa_russell@fws.gov

BIOLOGICAL INFORMATION:

Species Description *Pseudognaphalium sandwicensium* var. *molokaiense* is a perennial herb, 1 to 6.4 decimeters (dm) (3.9 to 25 inches (in)) tall with moderate to densely woolly pubescence. Stems are olive green to white or gray and vary in their degree of erectness and branching. Leaves are linear with both surfaces densely wooly pubescent. Whitish to pale yellow flower heads occur in terminal, leafless clusters. This variety is distinguished from other varieties of the species in that the entire plant is covered in very dense white wooly pubescence; the stems are prostrate to sometimes erect, 1 to 3 dm (3.9 to 11.8 in) long; the leaves are spatulate to narrowly obovate with the lower ones usually 7 to 20 millimeters (0.3 to 0.8 in) wide; and only the tips of the involucral bract in the flower heads are exposed while the remainder is densely wooly pubescent (Wagner *et al*. 1999a).

Taxonomy First described by Degener and Sherff in 1948 as an infraspecific taxon in the genus *Gnaphalium*, Wagner *et al.* (1997) moved the entire species to *Psuedognaphalium*. This variety is recognized as a distinct taxon in Wagner *et al*. (1999a) and Wagner and Herbst (2003), the most recently accepted Hawaiian plant taxonomy.

Habitat Typical habitat is strand vegetation in dry consolidated dunes (Wagner *et al*. 1999a).

Historical and Current Range/Current Status Historically, *Pseudognaphalium sandwicensium* var. *molokaiense* was collected from Oahu and Lanai, in addition to its current distribution on the islands of Molokai and Maui (Clyde Imada, Bernice P. Bishop Museum, *in litt*. 2005). It has not been reported on Lanai for over 45 years or on Oahu for over 70 years. Currently, this variety is known from two populations totaling several hundred individuals in the Moomomi area on the island of Molokai, and 25 individuals are found at Puu Kahulianapa on west Maui (Robert Hobdy, Hawaii Division of Forestry and Wildlife, pers. comm. 1995; Hank Oppenheimer, Maui Land and Pineapple Company, pers. comm. 2004; Wailana Moses, The Nature Conservancy of Hawaii, *in litt*. 2005).

THREATS:

A. The present or threatened destruction, modification, or curtailment of its habitat or range. *Pseudognaphalium sandwicensium* var. *molokaiense* is threatened by wild cattle (*Bos taurus*) and axis deer (*Axis axis*) that adversely modify habitat (R. Hobdy, pers. comm. 1995; W. Moses, *in litt*. 2005). As early as 1778, European explorers introduced livestock, which became feral, increased in number and range, and caused significant changes to the natural environment of Hawaii. Past and present activities of introduced alien mammals are the primary factor altering and degrading vegetation and habitats on Molokai and Maui. Cattle, the wild progenitor of which was native to Europe, northern Africa, and southwestern Asia, were introduced to the Hawaiian Islands in 1793. Large feral herds developed as a result of restrictions on killing cattle decreed by King Kamehameha I. While small cattle ranches were developed on Kauai, Oahu, and west Maui, very large ranches of tens of thousands of acres were created on east Maui and Hawaii. Much of the land used in these private enterprises was leased from the State or was privately owned and classified as Forest Reserve and/or Conservation District land. Cattle eat native vegetation, trample roots and seedlings, cause erosion, create disturbed areas into which alien plants invade, and spread seeds of alien plants in their feces and on their bodies. The forest in areas grazed by cattle becomes degraded to grassland pasture, and plant cover is reduced for many years following removal of cattle from an area. Several alien grasses and legumes purposely introduced for cattle forage have become noxious weeds (Tomich 1986; Cuddihy and Stone 1990).

Axis deer, originally released on the island of Molokai in 1868, can now be found in extensive populations on the islands of Maui, Molokai and Lanai. Deer eat native vegetation, trample roots and seedlings, cause erosion, and promote the invasion of alien plants.

Ungulate exclusion fences protect the population of *Pseudognaphalium sandwicensium* var. *molokaiense* on Molokai. No conservation measures have been implemented to date to address this threat on Maui.

B. Overutilization for commercial, recreational, scientific, or educational purposes. *Pseudognaphalium sandwicensium* var. *molokaiense* may be collected for making lei (floral necklaces). Off-road vehicles are a potential threat to this variety (R. Hobdy, pers. comm. 1995). No known conservation measures have been implemented to date to address these threats.

C. Disease or predation.
None known.

D. The inadequacy of existing regulatory mechanisms.
Deer are managed as a game animal in Hawaii. Deer hunting is allowed on all islands either year-round or during certain months, depending on the area (Hawaii Department of Land and Natural Resources n.d.-a, n.d.-b, n.d.-c). However, public hunting does not adequately control the number of ungulates to eliminate this threat to native plant species. Hunting of feral cattle is no longer allowed in Hawaii (Hawaii Department of Land and Natural Resources 1985) except under permitted conditions. No other known conservation measures have been taken to date to address this threat.

E. Other natural or manmade factors affecting its continued existence.
Alien plant species threaten this species (R. Hobdy, pers. comm. 1995; W. Moses, *in litt*. 2005). Although the exact pest species that threaten this plant have not been identified, alien pest plants are found throughout the areas where this species occurs. The original native flora of Hawaii consisted of about 1,400 species, nearly 90 percent of which were endemic. Of the total native and naturalized Hawaiian flora of 1,817 taxa, 47 percent were introduced from other parts of the world, and nearly 100 species have become pests (Smith 1985; Wagner *et al*. 1999a). Confirmed personal observations (R. Hobdy, pers. comm. 1995; W. Moses, *in litt*. 2005) and several studies (Cuddihy and Stone 1990; Wood and Perlman 1997; Robichaux *et al*. 1998) indicate nonnative plant species may outcompete native plants similar to *Pseudognaphalium sandwicensium* var. *molokaiense*. Competition may be for space, light, water, or nutrients, or there may be a chemical inhibition of other plants (Smith 1985; Cuddihy and Stone 1990). In addition, nonnative pest plants found in habitat similar to that of this species have been shown to make the habitat less suitable for native species (Smathers and Gardner 1978; Smith 1985; Loope and Medeiros 1992; Medeiros *et al.* 1992; Ellshoff *et al.* 1995; Meyer and Florence 1996; Medeiros *et al.* 1997; Loope *et al*. 2004). In particular, alien pest plant species modify habitat by modifying availability of light, altering soil-water regimes, modifying nutrient cycling, or altering fire characteristics of native plant communities (Smith 1985; Cuddihy and Stone 1990; Vitousek *et al*. 1987). Because of demonstrated habitat modification and resource competition by nonnative plant species in habitat similar to the coastal dune habitat of *P. sandwicensium* var. *molokaiense*, the Service believes nonnative plant species are a threat to *P. sandwicensium* var. *molokaiense*. Currently, many widespread alien plant taxa cannot be completely eradicated from Molokai and Maui, and therefore are expected to continue dispersing into previously managed areas (Loope 1998, Smith 1985). No conservation measures have been implemented to date to address this threat on Maui.

In addition, species like *Pseudognaphalium sandwicensium* var. *molokaiense* that are endemic to only portions of small islands are inherently more vulnerable to extinction than widespread species because of the higher risks posed to a few populations and individuals by genetic bottlenecks, random demographic fluctuations and localized catastrophes such as hurricanes (R. Hobdy, pers. comm. 1995). When considered on their own, the natural processes associated with a limited distribution and the habitat perturbation caused by hurricanes do not affect *P. sandwicensium* var. *molokaiense* to such a degree that it is threatened or endangered with

extinction in the foreseeable future, but these natural processes can exacerbate the threat from anthropogenic factors, such as habitat loss for human development or predation by alien species.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED
Ungulate exclusion fences protect the population of *Pseudognaphalium sandwicensium* var. *molokaiense* on Molokai and weed control is on-going in the Moomomi area.

SUMMARY OF THREATS
The major threats to this species include feral cattle, axis deer and nonnative plant species, which are believed to be a major cause of the decline of this species throughout its range. Potential threats include off-road vehicles and collection for lei-making. Ungulate exclusion fences protect the population of *Pseudognaphalium sandwicensium* var. *molokaiense* on Molokai and The Nature Conservancy of Hawaii is conducting weed control in the Moomomi area. No conservation measures have been implemented to date to address the threats on Maui.

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	**Imminent**	Monotypic genus	1
		Species	2
		Subspecies/population	**3***
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:
Magnitude:
This species is highly threatened by axis deer (Maui and Molokai) and feral cattle (Molokai), that degrade and destroy habitat and non-native plants that compete for light and nutrients. Potential threats include collection for lei and off-road vehicles that directly damage plants and degrade habitat. Threats to the strand vegetation in dry consolidated dune habitat of *Pseudognaphalium sandwicensium* var. *molokaiense* and to individuals of this species occur throughout its range and are expected to continue or increase without their control or eradication. While ungulate exclusion fences protect the population of *Pseudognaphalium sandwicensium* var. *molokaiense* on Molokai and weed control has been implemented in this population, no conservation efforts have been initiated to date for the population on Maui.

Imminence:
Threats to *Pseudognaphalium sandwicensium* var. *molokaiense* from axis deer and nonnative plants are considered imminent because they are ongoing in the population on Maui.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No. The species does not appear to be appropriate for emergency listing at this time because the immediacy of the threats is not so great as to imperil a significant proportion of the taxon within the time frame of the routine listing process. Ungulate exclusion fences protect the population of *Pseudognaphalium sandwicensium* var. *molokaiense* on Molokai and weed control has been implemented in this population. However, no conservation efforts have been initiated to date for the population on Maui. If it becomes apparent that the routine listing process is not sufficient to prevent large losses that may result in this species' extinction, then the emergency rule process for this species will be initiated. We will continue to monitor the status of *P. sandwicensium* var. *molokaiense* as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures.

DESCRIPTION OF MONITORING:
The information in this form is based on the results of a meeting of 20 botanical experts held by the Center for Plant Conservation in December of 1995, and was updated by personal communication with Robert Hobdy of Hawaii's Division of Forestry and Wildlife. We have incorporated additional information on this species from our files and the most recent supplement to the *Manual of the Flowering Plants of Hawaii* (Wagner and Herbst 2003). In 2004 the Pacific Islands office contacted the following species experts: Bob Hobdy, retired from Hawaii Division of Forestry and Wildlife; Joel Lau, Hawaii Natural Heritage Program; Art Medeiros, U.S.G.S. Biological Resources Discipline; Hank Oppenheimer, resource manager for Maui Land and Pineapple Company; and Steve Perlman and Ken Wood, National Tropical Botanical Garden. No new information was provided in 2004. In 2005 we contacted the species experts listed below, and confirmation of the status of *Pseudognaphalium sandwicensium* var. *molokaiense* on Molokai was provided by Wailana Moses of The Nature Conservancy of Hawaii.

The Hawaii Natural Heritage Program identified this species as vulnerable (Hawaii Natural Heritage Program Database 2004). Based on the International Union for Conservation of Nature and Natural Resources Red Plant Data Book rarity categories, this species is recognized as Vulnerable (likely to be endangered unless threats to its survival are removed or reduced) (Wagner *et al.* 1999b).

One species expert provided new information confirming the status of the species this year on Molokai and the results are included in this assessment. Other species experts were contacted but did not provide new information this year, no new literature was found, and no known entities are studying this species. However, it is highly likely that the previously reported threats

continue to impact the species at the same or an increased level on Maui.

COORDINATION WITH STATES

In October 2004 we provided the Hawaii Division of Forestry and Wildlife with copies of our most recent candidate assessments for their review and comment. Vickie Caraway, the State botanist, reviewed the information for this species and provided no additional information or corrections (V. Caraway, pers. comm. 2005).

LITERATURE CITED

List all experts contacted:

Name	Date	Place of Employment
1. Joel Lau	June 28, 2005	Hawaii Natural Heritage Program
2. Art Medeiros	June 28, 2005	U.S.G.S. Biological Resources Discipline
3. Jim Jacobi	June 28, 2005	U.S.G.S. Biological Resources Discipline
4. Rick Warshauer	June 28, 2005	U.S.G.S. Biological Resources Discipline
5. Hank Oppenheimer	June 28, 2005	Maui Land and Pineapple Company
6. Kapua Kawelo	June 28, 2005	U.S. Army
7. Dave Lorence	June 28, 2005	National Tropical Botanical Garden
8. Steve Perlman	June 28, 2005	National Tropical Botanical Garden
9. Ken Wood	June 28, 2005	National Tropical Botanical Garden
10. Marie Bruegmann	July 13, 2005	U.S. Fish and Wildlife Service
11. Vickie Caraway	June 14, 2005	Hawaii Division of Forestry and Wildlife
12. Wailana Moses*	October 17, 2005	The Nature Conservancy of Hawaii

*Provided new information on this taxon in 2005

List all databases searched:

Name	Date
1. Hawaii Natural Heritage Program	2004

Other resources utilized:

Center for Biological Diversity, Dr. Jane Goodall, Dr. E.O. Wilson, Dr. Paul Ehrlich, Dr. John Terborgh, Dr. Niles Eldridge, Dr. Thomas Eisner, Dr. Robert Hass, Barbara Kingsolver, Charles Bowden, Martin Sheen, the Xerces Society, and the Biodiversity Conservation Alliance. 2004. Hawaiian Plants: petitions to list as federally endangered species. May 4, 2004.

Cuddihy, L.W., and C.P. Stone. 1990. Alteration of native Hawaiian vegetation; effects of humans, their activities and introductions. Coop. Natl. Park Resources Stud. Unit, Hawaii. 138 pp.

Ellshoff, Z.E., D.E. Gardner, C. Wikler, and C.W. Smith. 1995. Annotated bibliography of the genus *Psidium*, with emphasis on *P. cattleianum* (strawberry guava) and *P. guajava* (common guava), forest weeds in Hawai`i. Cooperative National Park Resources Studies Unit, University of Hawaii. Technical Report 95.

Loope, L.L. and A.C. Medeiros. 1992. A new and invasive grass on Maui. Newsletter of the Hawaiian Botanical Society 31: 7-8.

Loope, L., F. Starr and K. Starr. 2004. Management and research for protecting endangered

Hawaiian plant species from displacement by invasive plants on Maui, Hawaii. Weed Technology 18: 1472-1474.

Medeiros, A.C., L.L. Loope, P. Conant and S. McElvaney. 1997. Status, ecology, and management of the invasive plant, *Miconia calvescens* DC (Melastomataceae) in the Hawaiian Islands. Bishop Mus. Occas. Pap. 48: 23-36.

Medeiros, A.C., L.L. Loope, T. Flynn, S.J. Anderson, L.W. Cuddihy, and K.A. Wilson. 1992. Notes on the status of an invasive Australian tree fern (*Cyathea cooperi*) in Hawaiian rain forests. American Fern Journal 82: 27-33.

Meyer, J.-Y. and J. Florence. 1996. Tahiti's native flora endangered by the invasion of *Miconia calvescens* D.C. (Melastomataceae). Journal of Biogeography 23: 775-781.

Robichaux, R., J. Canfield, F. R. Warshauer, L. Perry, M. Bruegmann, and G. Carr. 1998. Adaptive Radiation. Endangered Species Bulletin. November/December.

Scott, J.M., S. Mountainspring, F.L. Ramsey, and C.B. Kepler. 1986. Forest bird communities of the Hawaiian Islands: Their dynamics, ecology, and conservation. Studies in Avian Biology 9:1-429. Cooper Ornithological Society, Los Angeles.

Sherff, E.E. 1948. A new variety of *Gnaphalium sandwicensium* Gaud. in the Hawaiian Islands. Lloydia 11: 309.

Smathers, G.A. and D.E. Gardner. 1978. Stand analysis of an invading firetree (*Myrica faya* Aiton) population, Hawai`i. Proceeding of the Second Conference on Natural Science, Hawaii Volcanoes National Park, pp. 274-288.

Smith, C.W. 1985. Impact of alien plants on Hawai`i's native biota: in Stone, C.P., and J.M. Scott (eds.), Hawai`i's terrestrial ecosystems: preservation and management. Coop. Natl. Park Resources Stud. Unit, Univ. Hawaii, Honolulu, pp. 180-250.

Vitousek, P.M., C.M. D'Antonio, L.L. Loope, M. Rejnanek, and R. Westerbrooks. 1997. Introduced species: a significant component of human-caused global change. New Zealand Journal of Ecology 21(1): 1-16.

Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1999a. Manual of the Flowering Plants of Hawai`i, Bishop Mus. Spec. Publ. 97:1-1918. University of Hawaii Press and Bishop Museum Press, Honolulu.

Wagner, W.L., M.M. Bruegmann, and J.Q.C. Lau. 1999b. Hawaiian vascular plants at risk: 1999. Bishop Mus. Occas. Pap. 60: 1-58.

Wagner, W.L. and D.R. Herbst. 2003. Electronic supplement to the manual of flowering plants of Hawai'i, version 3.1. December 12, 2003. Available from the Internet. URL: http://rathbun.si.edu/botany/pacificislandbiodiversity/hawaiianflora/supplement.htm.

Wagner, W. L., R. K. Shannon, and D. R. Herbst. 1997. Contributions to the flora of Hawai`i. Bishop Mus. Occas. Pap. 48: 51--65.

Wenkam, R. 1969. Kauai and the park country of Hawaii. Sierra Club, San Francisco.160 pp.

Wood, K.R. and S. Perlman. 1997. Maui 14 plant survey final report. Submitted by National Tropical Botanical Garden, October, 1997.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes to the candidate list, including listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all 12-month petition findings, additions of species to the candidate list, removal of candidate species, and listing priority changes.

Approve: Acting _____ 11/16/05
Regional Director, Fish and Wildlife Service Date

Concur: _____ August 23, 2006
Director, Fish and Wildlife Service Date

Do not concur: _____ _____
Director, Fish and Wildlife Service Date

Date of annual review: September 20, 2005
Conducted by: Marie M. Bruegmann, Pacific Islands FWO
Plant Recovery Coordinator

Comments:
PIFWO Review

Reviewed by: Christa Russell Date: September 27, 2005
Plant Conservation Program Leader

Gina Shultz Date: October 17, 2005
Assistant Field Supervisor,
Endangered Species

Patrick Leonard Date: October 17, 2005
Field Supervisor